

PATENT SPECIFICATION



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COMPLETE SPECIFICATION

Improvements in or relating to Blast Furnaces

We, GESELLSCHAFT FÜR LINDE'S EISMASCHINEN A.G., a German Company, of Hellriegelskreuth, near Munich, Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

The invention relates to the operation of blast furnaces for the production of pig iron, fused cement, or the like. In particular it has to do with methods of supplying such furnaces with oxygen-enriched blast, and apparatus therefor.

The use of oxygen-enriched blast has previously been suggested for the production of hot-flowing types of pig iron in a blast furnace or for the elimination of hanging disturbances and to obtain other advantages.

The object of the present invention is to correct one-sided descent of the charge in shaft furnaces, in particular blast furnaces.

The process according to the invention is characterised by the fact that a blast with increased oxygen concentration is not so that part of the furnace in which the charge descends with difficulty.

With this new method of operation it is possible to introduce relatively high oxygen concentrations at those points where the charge descends with difficulty, or does not descend smoothly, thus appreciably increasing the smelting capacity at such points and in this manner smelting out local accumulations of material in the furnace. The method of the present invention thus offers the possibility of remedying any irregular descent of the charge in the furnace which heretofore was attainable neither with gas that was without blast. An additional advantage of the new method consists in that the quite appreciable oxygen losses, which occur through leaks in the blast headers or in the bustle pipes and the like of the blast furnace, are avoided.

The process of the invention is illustrated by the following drawings:

In the drawings F represents a furnace wall, other parts being identified as they are mentioned.

As shown in Fig. 1, high purity oxygen or an oxygen-enriched gas produced in an air separation plant, or from any convenient source, may be supplied from a header pipe (not shown) surrounding the furnace to separate conduits or pipes 11 which severally lead to the individual blast tuyeres 13 located at intervals circumferentially of the furnace. The oxygen or oxygen-enriched mixture, in a volume controllable by a valve 12 in each pipe 11, flows through a conduit 15 in the water jacket 14 of a blast tuyere 13, and thence through the inner wall of the blast tuyere into the hot blast being discharged through the tuyere into the furnace.

A somewhat different method of carrying out the process is illustrated in Fig. 2. In this variant the oxygen or oxygen-enriched gas is conducted to approximately the center of the tuyere mouth by means of a conduit 16 extending from the inner wall of the blast tuyere. The conduit 16 is preferably made of ceramic material, or in the event it is made of iron, it is protected by means of heat-insulating material from the heat of the hot blast in order to prevent the conduit from becoming heated to such an extent that it will burn off in the oxygen stream.

In accordance with the new method of the invention, to improve regulating possibilities the oxygen or the oxygen-enriched gas of higher oxygen content than air preferably is supplied in a cold or unheated state to the individual blast tuyeres, in contradistinction to previous methods wherein oxygen-enriched preheated blast was supplied to the tuyeres. With former methods of operation, it has been economical to produce in the air separation plant a gas mixture containing approximately 45% oxygen and use this mixture for enriching the blast. With the method of the present invention, however, the oxygen

order to decrease the volume of gas discharged in a cold or reheated state into the furnace. Inasmuch as the blast heaters, due to the separate introduction of unheated or cold oxygen to the tuyeres in accordance with the invention, need only heat the blast air, it becomes possible to heat the air in the blast heaters to a temperature higher than was possible with previous methods of operation, and thereby offset the cooling effect of the colder oxygen.

Although the invention has been described in terms of a preferred embodiment wherein oxygen-enrichment of the blast is accomplished directly at the individual tuyeres, it will be evident that in applying the process of the invention to metallurgical operations in general, the blast-enriching oxygen may, if desired, be introduced into individual tuyere blast pipes without departing from the scope of the invention.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Process for correcting one-sided descent of the charge in shaft furnaces, in particular blast furnaces, characterised by the fact that a blast with increased oxygen concentration is fed to that part of the furnace in which the charge descends with difficulty.

2. Process according to claim 1, characterised by the fact that the oxygen is

fed separately to each individual blast tuyere of the shaft furnace and is mixed with the blast air in a regulatable manner only when it reaches there.

3. Process according to claim 1, characterised by the fact that the oxygen is admixed with highly heated blast air in the blast tuyere as cold high purity oxygen.

4. Blast tuyere when used for carrying out the process according to claim 1, wherein the feed pipe for the oxygen to be admixed with the blast air is passed through the water jacket, characterised by the fact that the feed pipe is extended to the inner wall of the blast tuyere and/or into the centre of the blowing cross-section.

5. Process for correcting one-sided descent of the charge in shaft furnaces, substantially as hereinbefore described with reference to the accompanying drawings.

6. Blast tuyere when used for carrying out the process according to claim 5, constructed and adapted to operate substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 6th day of December, 1935

HASELTINE, LAKE & CO.,

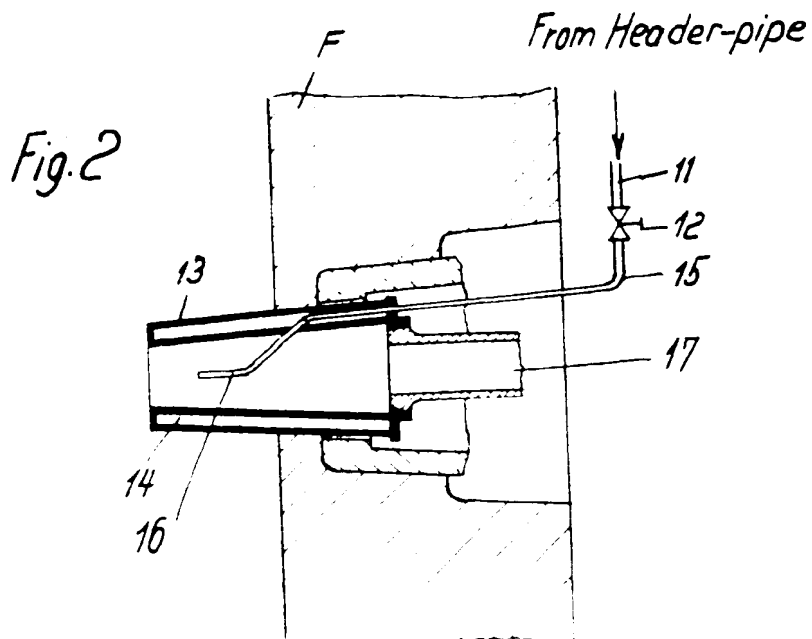
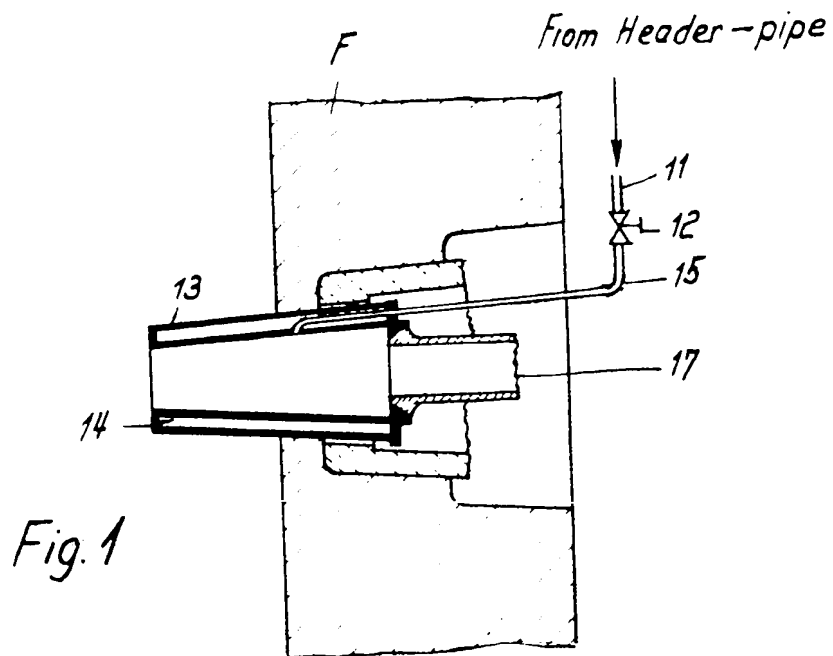
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[This Drawing is a full size reproduction of the Original.]